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ROCKS AND MINERALS

1941

A Magazine for Mineralogists, Geologists and Collectors . . .

Official Journal of the Rocks and Minerals Association

January, 1941

Vol. 16, No. 1 Twenty-Five Cents Whole No. 114

THE ROCKS AND MINERALS ASSOCIATION

PEEKSKILL, N. Y.

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Organized in 1928 for the increase and dissemination of mineralogic knowledge

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To stimulate public interest in geology and mineralogy and to endeavor to have courses in these subjects introduced in the curricula of the public school systems; to revive a general interest in minerals and mineral collecting; to instruct beginners as to how a collection can be made and cared for; to keep an accurate and permanent record of all mineral localities and minerals found there and to print same for distribution; to encourage the search for new minerals that have not yet been discovered; and to endeavor to secure the practical conservation of mineral localities and unusual rock formations.

Ever since its foundation in 1928, the Rocks and Minerals Association has done much to promote the interest in mineralogy. It has sponsored outings, expeditions, formations of mineralogical clubs and the printing of many articles that have been a distinct contribution to mineralogy.

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Mineralogical clubs which subscribe for **Rocks and Minerals** also become affiliated members of the Rocks and Mineral Association and enjoy all the advantages which such an affiliation affords.

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Affiliation with the world's largest mineralogical society cannot fail to increase membership, enlarge circles of acquaintanceship, and stimulate a keener interest in mineralogy.

A list of affiliated clubs will be found among the back pages of the magazine.

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Rocks and Minerals

PUBLISHED MONTHLY

Edited and Published by
PETER ZODAC

January
1941

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Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879.

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Specially written articles (as contributions) are desired.

Subscription price $2.00 a year; Current numbers, 25c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit direct to the Publisher.

Issued on the 1st day of each month.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The Official Journal of the Rocks and Minerals Association

Chips from The Quarry

IF YOU CAN'T WRITE—PRINT!

Mr. John A. Grenzig, the popular mineral dealer of Brooklyn, N. Y., files a complaint with which we are in hearty accord. He complains that many collectors sending in orders write their names and addresses so carelessly that he has great trouble in reading them; that sometimes packages he has thus sent out were returned to him by the Post Office because of faulty addresses.

This is an experience with which mineral dealers are only too familiar and likewise editors of magazines. The carelessness with which many individuals send in orders is to be pittied. Stranger still is the fact that many of the careless ones receive their orders.

We frequently receive letters in which stamps or currency are enclosed for sample copies of the magazine but which contain no signatures of the senders nor their addresses—just a brief message—"Please send us a sample copy of ROCKS AND MINERALS." The letter may carry a date and possibly the name of a city—Portland, Oregon—for example. The envelope carries no address either but the postmark may read "Los Angeles, Calif." There is nothing we can do but wait for the sender to write again when possibly he may give his address so that his order may be filled.

Another instance which causes some difficulty is to have two addresses appear in a letter. At the top is that in one city while at the bottom is that of another city.

At times we receive envelopes which contain no letter nor a message of any kind, just checks or money orders. Then we have to go through our records to see if the amount so sent in can cover some outstanding account.

The above incidents are not so common as those in which names and addresses are so scribbled as to be unintelligible to us. Then we have to clip the addresses and affix them on the envelopes of letters to be sent with the thought in mind that the Post Office employees are better equipped to wrestle with the problem than we.

Mineral collectors are not the only individuals to be censored for scribbled addresses. The Post Office "boys"—of all people—are likewise guilty. Many times when a subscriber changes his place of residence we are notified by the Post Office and every card so received costs us 2c. At times the new addresses on these cards are so unintelligible that we refuse to accept them; then they have to be sent back to the Post Office from which they originated for better addresses.

This carelessness on the part of Americans to write their names and addresses unintelligibly is to be regretted. We are always in a hurry—to go nowhere or do nothing—and so have not the time to give attention to a matter which is for our own benefit.

Peter Zodac

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The Official Journal of the ROCKS and MINERALS ASSOCIATION

Whole No. 114

SHAFT 7 NEAR FISHKILL, N. Y.

By PETER ZODAC

Editor, Rocks and Minerals

In the construction of the Delaware Aqueduct, the New York City Board of Water Supply has sunk 31 shafts which vary in depth from 310 to 1550 feet. The shafts with their connecting tunnels, begin at Lackawack Dam on the Rondout Creek, in Ulster County, and end at the New York City line. The total length of the tunnels when finished will be 85 miles long—the longest continuous tunnel in the world. Shafts 1 to 5A are west of the Hudson River, the others are east. The aqueduct is being built, principally, to tap the water shed of the Delaware River.

Location

Shaft 7 is in the southwestern part of Dutchess County, one mile east of the Albany Post Road, U. S. Route 9; in fact it can be seen from the highway. Two small dirt roads, a few hundred feet apart and both north of Moog's farm (the first only 100 feet north) on Route 9, lead up to it. Moog's farm is 2.3 miles north of the Putnam—Dutchess County Line and 1.3 miles south of the village of Fishkill which is also on Route 9. Dutchess County is in the southeastern part of the State.

History

Shaft 7 was started May 11, 1937, and finished Feb. 21, 1938. Two tunnels, one going northwest and the other southeast and known as the North and South Tunnels, lead off at its bottom. The shaft was sunk and 200 feet of tunnel driven in each direction by the W. E. Callahan Construction Co. and J. P. Shirley. The Dravo Corporation of Pittsburgh, Penn., are the present contractors.

Layout

Shaft 7 is 777 ft. deep, 14 ft. in diameter and concreted. The North Tunnel, heading in the direction of Shaft 6, was in 9,417 ft. on Sept. 26, 1940, and the South Tunnel, heading in the direction of Shaft 8, was in 7,108 ft. on Sept. 26, 1940. Both tunnels are 17.6 ft. in unlined diameter and when concreted will be 13.5 ft. The North Tunnel is to extend 15,263 ft. where it will meet the South Tunnel from Shaft 6; the total length of tunnel between Shafts 6 and 7 will be 27,388 feet. In like manner will the South Tunnel extend 12,482 feet towards Shaft 8 and the total length of tunnel between the two shafts will be 26,497 ft. The North Tunnel is level; the South Tunnel is level for 403 ft. and then extends on an upgrade for 2½ miles, thence level to Shaft 8. The elevation of the surface at Shaft 7 is + 447 feet; the elevation at bottom of shaft is -330 ft. The bottom of the shaft, therefore, is 330 ft. below sea level.

Geology

Three formations are present in the vicinity of Shaft 7 and two have been tapped by the tunnels. The shaft is entirely in Highlands gneiss whose age is considered to be the equivalent of the Grenville gneiss (Grenville Age[1]). The others are the Wappinger limestone and the Poughquag quartzite, both of Cambro-Ordovician Age[2].

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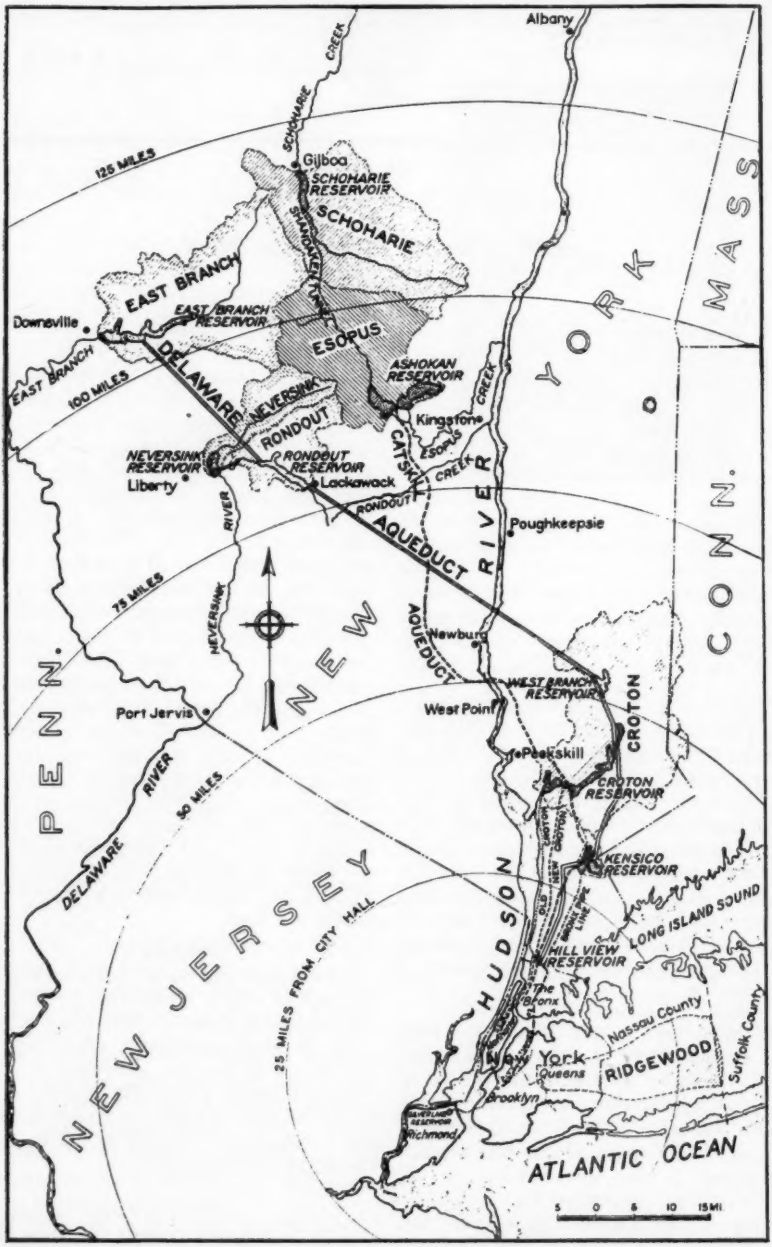
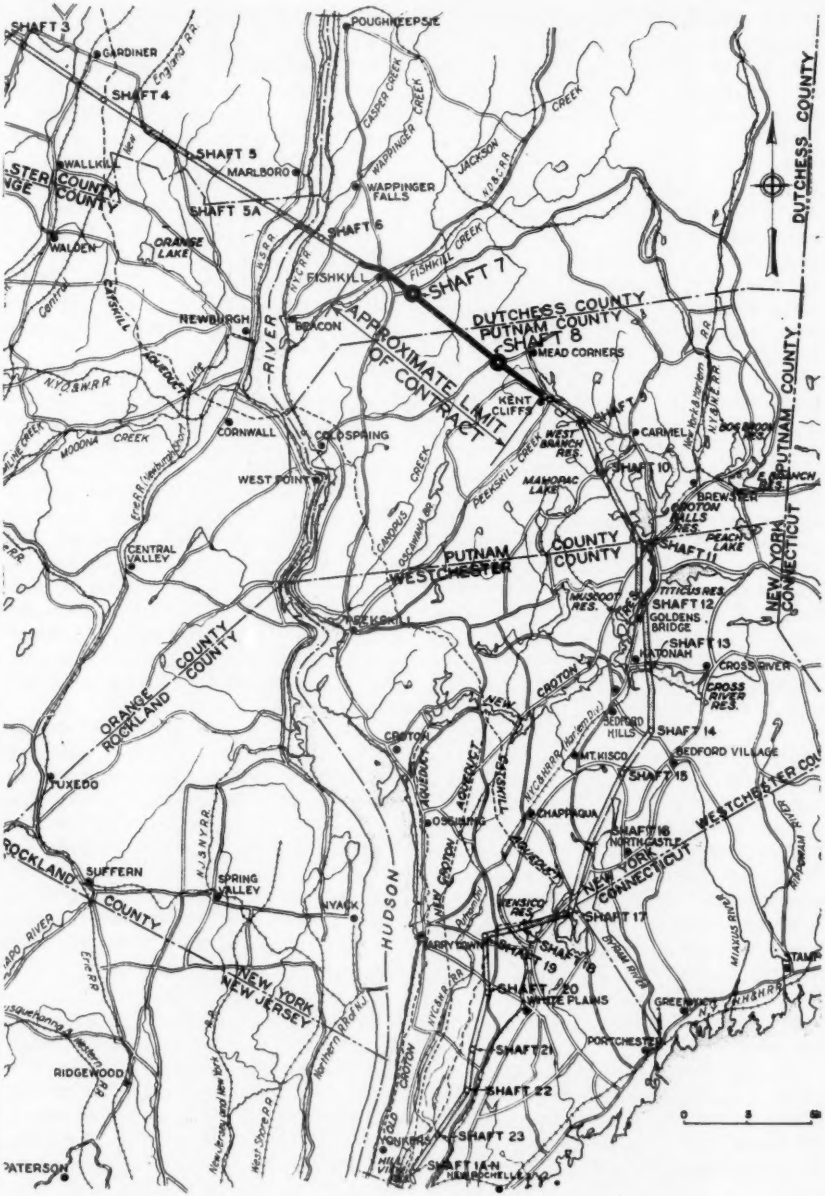
1 *Geology of the West Point Quadrangle* N. Y., by Charles P. Berkey and Marion Rice. N. Y. S. Mus. Bull. 225-226, Albany, N Y., 1921, p.23.

2 Ibid, p 23.



The Delaware Water Supply System
(Courtesy The Delaware Water Supply News)



Map of southeastern New York showing locations of shafts and tunnels of the larger portion of the Delaware Water Supply System.

(Courtesy New York City Board of Water Supply).

The Highlands gneiss, which is the chief formation around the shaft, consists aiso of diorite, granite, and pegmatite. It extends for 2,600 ft. north of the shaft and all the way, apparently, to Shaft 8.

At Sta.[3] 1887+54, the elevation of which is -260 ft. below sea level (about 4,000 ft. southeast of the shaft), which point was reached on April 17, 1940, and examined by the writer, it was noticed that the face of the heading consisted of very coarse dark green actinolite with large amounts of pyrite penetrated by two or three pinkish pegmatite dikes. Much cracking of the rock was heard and many slabs would scale off and fall down. This cracking, or "popping" rock as it is sometimes called, would at times become quite common in the South Tunnel so as to require the erection of steel supports against the roof and sides to improve the rock stability for the protection of the workmen and to keep the tunnel clear for haulage. Examination of the popping rock disclosed the fact that all minerals in it were practically of the same hardness, 6 to 7, very brittle, and all of good size. No mica was visible. This type of rock was, accordingly, very tough to drill and when blasted, shattered easily. The absence of mica also accounts for the scaling which made steel supports necessary. Mica is both a soft and an elastic mineral. Its presence in ordinary amounts makes a rock easier to drill. Its elastic binding faculty also serves to limit scaling following blasting.

It was thought that the quartzite would be met in the South Tunnel before the excavation had progressed 5,000 ft. The tunnel has now been driven over 7,000 ft. and no signs of the rock has been seen.

Mr. Bird,[4] the Board's Geologist, reports: "The quartzite forms the bedrock at the surface for almost a mile along the tunnel line between Shafts 7 and 8. There are extensive and easily seen outcrops in the West Fishkill Hook district, where the overlying Wappinger may be seen to within a couple feet of the top of the quartzite. At first we thought this stretch was deep enough at places to reach tunnel grade but after the contract drawings had been made and the contract let, I found additional evidence that indicated it did not extend below a couple hundred feet in depth at the most."

Poughquag quartzite is a very tough, grayish-white, massive rock, strongly jointed, the joints generally stained brown by iron.

North of the shaft, the Highlands gneiss extends to Sta. 1819+62 where a thrust fault is present and where the Wappinger limestone begins. Again quoting Mr. Bird[5]: "The Wappinger extends to within a few hundred feet of the end of Dravo's contract where a gneiss outlier, a couple hundred feet thick, will be passed through, and on the other side of which the tunnel will pass into the Hudson River formation (shales, slates and sandstone), in which it will continue to the end of the contract and on to Shaft 6, all of which has been excavated."

The Wappinger limestone is a dark bluish-black, finely crystalline rock. In the North Tunnel it is so pentrated by numerous joints filled with calcite, that large blocks free from joints are unknown. It is interesting to record that though this limestone has been excavated 330 feet below sea level it contains small vugs or cavities in which tiny but fine calcite crystals occur which are both fluorescent and phosphorescent.

Mineralogy

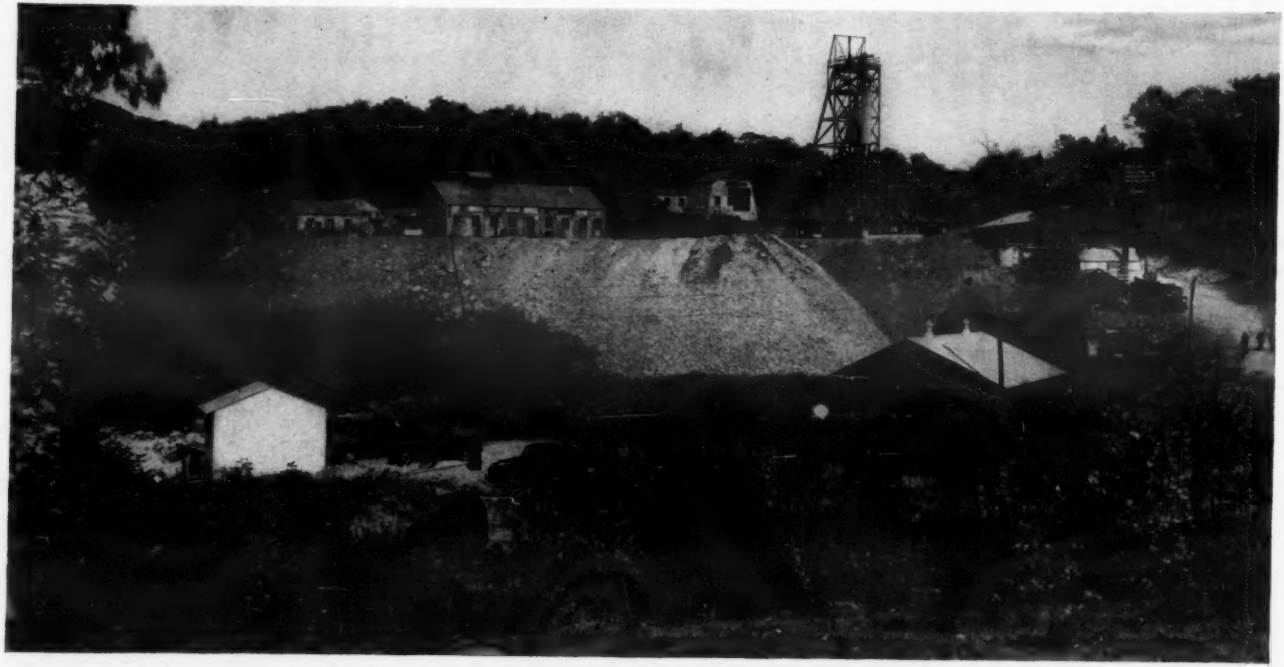
The tunnels of Shaft 7 have the distinction of presenting a wider range of minerals than any other of the Delaware Aqueduct workings. Thirty-one species and twelve varieties are known to date, all from points below sea level too, and most of them have been found by Mr. Doherty, the Contractors' Geologist. The minerals found are:

Albite: This white feldspar is quite common in the pegmatites.

3 A station is an engineering term used to quickly locate any point along a line of survey, for example, a road or tunnel. One end of the line is 0+00. Then one hundred feet away is 1+00; two hundred feet away is 2+00; one thousand feet is 10+00.

4 Letter of October 10, 1940.

5 Ibid.



Surface layout at Shaft 7 — View looking East.

The extensive rock dump is divided into two sections — the right half consists of gneiss, granite, pegmatite and diorite which will be crushed for concreting purposes; the left half is Wappinger limestone that will be rejected.

(Courtesy of New York City Board of Water Supply).

Allanite: Lustrous black tabular crystals in pegmatite. Allanite is easily recognized from other black minerals by the dark brown zone which frequently surrounds it.

Amphibole, var.Actinolite: Common as dark green coarse crystalline masses associated with lustrous pyrite, also in dark green platy masses.

Amphibole, var.Asbestus: Common as grayish-green, fibrous masses and as long strands of fibers, both on pegmatite or occurring in veins in pegmatite. Grayish-green threads were also noted in actinolite.

Amphibole, var.Hornblende: Very common as black, often lustrous, masses in pegmatite.

Amphibole, var.Mountain Leather: This interesting mineral came to light on Friday, April 19, 1940, as a white to cream-colored lath-shaped sheet, 5 feet long, 4 inches wide and ½ inch thick when the heading in the North Tunnel (Sta. 1789+58) was blasted. The sheet was vertical and was present in a brown decomposed limestone seam in Wappinger limestone. The miners thought it was talc and all secured specimens of it. By the time Mr. Doherty's attention was called to it, the mineral had practically disappeared though a few remnants were still left in the roof. An interesting fact about the occurrence is that when the heading was blasted which exposed the mountain leather, all the rock did not fall out as it does generally, but clung loosely to the mountain leather. A lot of water poured out of this seam which necessitated grouting operations.

Apatite: Tiny rounded bluish crystals in white calcite were found in the South Tunnel.

Aragonite: Occurs as white incrustations on rocks.

Arsenopyrite: Small grains in gneiss have been seen by Mr. Doherty.

Axinite: One of the most interesting of minerals found anywhere on the aqueduct was made Wednesday, June 12, 1940, by Mr. Doherty when he picked up axinite. The mineral occurs as crystalline masses and small brilliant crystals pinkish in color, in calcite-filled vugs in pegmatite.

Biotite: Is present as lustrous black flakes in pegmatite, sometimes associated with hornblende. A loose crystal, about 1½ x 1½ inches in size, was also found.

In the Engineer's office, at the Shaft, are several nice specimens of biotite. One is a large black mass which is so compact it looks like hornblende and can easily be mistaken for this mineral. At least the writer thought it was hornblende when it was shown him until the hardness test was made on it.

Calcite: This mineral is very common in view of the fact that it is the chief constituent of the Wappinger limestone. It furthermore forms thin white stringers, about 1/16 of an inch thick, or fills joints in the limestone. It has also been noted as a small white vein in a dark green schistose rock from the South Tunnel.

In the North Tunnel it has been found as tiny white to colorless crystals lining vugs or cavities in the limestone. These crystals fluoresce a greenish-white under the Detectoscope and phosphoresce a deep white under the cold quartz lamp.[6]

In the South Tunnel tabular crystals have been found which were pale yellowish to almost colorless and coated with dazzling drusy pyrite. See pyrite.

In the Engineer's office, at the Shaft, is a nice specimen of yellowish crystallized calcite on limestone; another is a crystalline salmon calcite on limestone.

Chlorite: Has been found as a greenish inclusion in quartz which gives the latter a greenish color. Also noted as greenish incrustations on gneiss.

Dolomite: Small colorless to white crystals in joints of Wappinger limestone were found Wednesday, April 17, 1940, when the locality was visited. Good pinkish crystallized specimens have been found in the

6 Calcite Crystals found below Sea Level. ROCKS AND MINERALS, May, 1940, p.169.

North Tunnel at Sta. 1750+00, approximately, by Mr. Leo. Komiakoff, an inspector for the City, who is stationed at the shaft.

Epidote: It often forms thin green bands in gneiss, forming epidote gneiss. A large pure green mass is on display in the Engineers' Office at the shaft.

Fluorite: Purple cleavages on milky quartz have been found by Mr. Komiakoff. They are on display in the Engineers' Office.

It was Mr. Bird[7] who first found the mineral here. Again quoting from his letter: "My records show that on October 30, 1939, I found a specimen of beautiful blue fluorite in the North Tunnel in the roof at Station 1831+54. It formed about 25% of a thin vein, the rest of which was transparent quartz. The story of this specimen will be remembered a long time by me. The heading was being loaded when I entered. The fluorite was discovered in the roof about 4 feet from the face in a band of highly silicated limestone of Grenville age. I went to work on it with vengeance for the time was limited and I was afraid the blast would ruin it. One of the powder men, who had completed his part of the loading, took a look and joined me with a piece of drill steel. Just as the jumbo[8] on which we were standing began moving away from the heading, we broke the block loose but it fell into about 8 inches of muddy water in the bottom of the tunnel. I immediately went after it but didn't find it until I had been ordered away from the heading three times by the shift boss."

Garnet, var.Almandite: Small reddish grains in gneiss; Mr. Doherty has seen some grains that were ½ inch in diameter. Garnet is sometimes so plentiful as to give the rock a red color. Nice little crystals of garnet associated with molybdenite and orthoclase in massive smoky quartz were found Thursday, May 2, 1940, by Mr. Doherty.

Graphite: Occurs as lustrous black thin crumpled masses in Wappingers limestone. Found Wednesday, April 17, 1940.

Kaolin: Noted by Mr. Doherty as an alteration product of albite. It is white in color.

Limonite: Brown stains on rocks.

Microcline: Another feldspar which is very common in the South Tunnel. It occurs either as flesh-colored or reddish masses in pegmatite.

Molybdenite: Tiny platy masses associated with garnet and orthoclase in smoky quartz was found Thursday, May 2, 1940, by Mr. Doherty. It came from the South Tunnel.

Muscovite: Rather common as flakes and books (1½ inches in diameter and ½ inch thick) in pegmatite. Noted by Mr. Doherty. A very unusual form for the mineral occurs in masses of small bright green, greasy-appearing flakes that were found Wednesday, May 29, 1940 in the South Tunnel by Mr. Doherty. The mica resembled serpentine so much that it was thought to be this mineral. Dr. Frederick H. Pough, of the American Museum of Natural History, who very kindly examined a number of specimens from the shaft, identified it is muscovite.

Orthoclase: Lustrous grayish glassy cleavages with garnet crystals and smoky quartz have been found in the South Tunnel.

Phlogopite: A few small bronzy flakes in rock have been found by Mr. Doherty.

Pyrite: Shaft No. 7 has become famous to the miners of the locality and it was pyrite which has made it so. For this mineral has been found in such large amounts and often of a beautiful lustrous brassy color that miners could not resist taking specimens home as souvenirs, and especially after Mr. Doherty had made the whole shaft personnel, mineral conscious. A large number of pyrite specimens from Shaft 7 are now serving as paper weights all over the country.

7 Letter of October 10, 1940.

8 A jumbo is a large movable platform on which are mounted drills for reaching sections of the face that are far above the tunnel floor.

Pyrite has been seen in a number of forms at Shaft 7. It occurs as small masses in pegmatite; as nice brilliant little cubes on a colorless crust on gneiss; as very lustrous drusy crystals on Wappinger limestone.

The South Tunnel is especially prolific for pyrite. Very fine specimens of small lustrous crystals (pyritohedrons) on crystalline white calcite associated with dark green platy actinolite have been found. At Sta. 1900+30, approximately, a pocket was uncovered in the west wall on Tuesday, July 2, 1940, from which some very fine specimens were obtained. The pocket made its appearance as a water vein and when the water stopped running the miners who had been observing it noticed something glittering inside it. Investigation showed that the pocket was filled with pale yellowish to almost colorless tabular calcite crystals that were coated with dazzling pyrite crystals. The pocket is about 8 feet off the floor, is about 2 inches wide and goes in almost horizonally for about 8 feet. Due to the narrowness of the pocket, specimens are now obtainable, if at all, with great difficulty. Messrs. Doherty and Komiakoff visited the locality at midnight[9] (that very night) to collect specimens and some very nice ones were obtained.

Pyroxene, var.Augite: Dark green to almost black, crystalline, in pegmatite, has been observed by Mr. Doherty.

Pyroxene, var.Diopside: Coarse crystalline greenish masses were found in the South heading during the week of May 26, 1940, by Mr. Doherty. Titanite and tiny pyrite crystals were embedded in it.

Pyrrhotite: Sometimes found as small grains in pegmatite.

Rhodonite: Another find of great interest because it may represent the first occurrence of the mineral in New York State was made in July, 1940 by Mr. Doherty. The mineral found was rhodonite, which is pinkish, massive, and associated with hornblende. It takes a very nice polish; two cabochons have been made by Mr. Doherty which are on display in the Contractor's Office.

Quartz, var.Chert: The latest find made at the shaft was chert which was struck in the North Tunnel at Sta. 1754+45 on September 16, 1940 and extended for 75 feet. Mr. Doherty[10] informed the writer that it occurred as a vein 16 feet wide, when first struck: at 30 feet it started branching and these continued until they pinched out. How thick the vein was could not be determined but it did extend from floor to roof of the tunnel. It was so tough that drills could last for 6 inches, only.

Quartz, var.Milky: Massive, as a constituent of pegmatite. On Thursday, June 13, 1940, a two inch crevice was found in the North Tunnel lined with doubly terminated milky quartz crystals 2 inches in length, containing phantoms. These crystals were on pink dolomite crystals which in turn were on limestone.

Quartz, var.Rock Crystal: One-half inch clear crystals lining vugs 2 to 3 inches in diameter have been found at several intervals in the Wappinger limestone.

Quart, var.Smoky: Common as a constituent of pegmatite.

Serpentine, var.Chrysotile (Asbestus): Minutely thin whitish silky veins in precious serpentine.

Serpentine, var.Precious: This came out during the week of April 21, 1940. It occurred in large rounded masses up to 18 inches in diameter (rough balls) in gneiss and pegmatite in the South Tunnel, about 5,000 feet from the shaft. The mineral is dark, oily green with spots that are very dark and resembles that from Montville, N. J.

Some of the serpentine is a light green and gemmy (semi-translucent).

Stilbite: Small, transparent colorless platy crystals with a bluish cast have been found associated with tiny lustrous pyrite cubes encrust-

9 Collectors do crazy things. ROCKS AND MINERALS August 1940, p.278.

10 Personal communication.

ing a grayish crystalline feldspar (orthoclase?)

Sulphur: Noted in the South Tunnel in the form of 1/8 inch grains as alterations of pyrite in decomposed albite. Found by Mr. Doherty Friday, April 15, 1940.

Titanite: Fairly common as chocolate-brown wedged-shaped crystals in pinkish pegmatite; also associated with massive white calcite and dark green actinolite.

Acknowledgments

The grateful thanks of the writer are extended to Mr. R. Emmet Doherty, Geologist for the Dravo Corporation and President of the Rocks and Minerals Association, because it was his very cordial interest and cooperation which made this article possible; to Mr. R. W. Remp, General Superintendent of the Dravo Corporation for his warm approval of the article and in encouraging Mr. Doherty to cooperate with us; to Mr. Howard P. Barnes, Division Engineer for the New York City Board of Water Supply, under whose juristiction is Shaft 7, for his hearty cooperation in supplying us with letters of introduction and a permit for entering on the Board's property and for other valuable assistance; to Mr. Vincent G. Terenzio, of Mr. Barnes' office, for his critical examination of this paper and for supplying important data so that it would be accurate and complete; to Mr. Paul H. Bird, Geologist for the Board of Water Supply, for his critical examination of this paper relative to its geological features; and to Dr. Frederick H. Pough, of the American Museum of Natural History, for his very valuable assistance in identifying several of the most puzzling specimens, particularly the axinite and muscovite. All these gentlemen have cooperated wholeheartedly so that it was a pleasure and a privilege to prepare this paper.

The Dravo Corporation, always a leader in its field, has established a new precedent among contractors in the appointment of a geologist to its staff.

METALLURGISTS AND METALLURGICAL ENGINEERS NEEDED FOR NATIONAL DEFENSE WORK—MAXIMUM AGE LIMIT 60 YEARS

The United States Civil Service Commission has announced that it will again receive applications for positions of metallurgist and metallurgical engineer, various grades, with salaries ranging from $5,600 to $3,200 a year. An insufficient number of eligibles for filling these positions resulted from the examination which closed in September 1940. Difficulty is being encountered in filling positions in the Bureau of Mines in connection with the National Defense Program for the development of strategic metals. Qualified persons are urged to send their applications to the Commission's Washington office at once where they will be rated as received until December 31, 1941.

Applicants will not be given a written test. They will be rated on their educational training and experience. A 4-year college course with major study in chemistry, geology, mining, physics, engineering. or metallurgy is required plus responsible experience in metallurgy or metallurgical engineering. For the associate grade, appropriate graduate study may be substituted for the entire experience requirement; for the other grades, a partial substitution may be made. In each case, the graduate study must have specific value in the branch of metallurgy or metallurgical engineering in which the applicant wishes to be rated.

Applicants must not have passed their sixtieth birthday on the date of receipt of application. The salaries for all grades are subject to a 3½ percent deduction toward a retirement annuity.

Further information regarding the examination and the proper application forms may be obtained from the Secretary of the Board of U. S. Civil Service Examiners at any first- or second-class post office, or from the United States Civil Service Commission, Washington, D. C.

THE GREEN RIDGE PEGMATITE, GRAND COUNTY, COLORADO (1)

By RONALD L. IVES

Abstract

Preliminary studies of pegmatites on the western slope of the Colorado Front Range, between Granby and Grand Lake, disclose an exposed mass of pegmatitic material of relatively enormous extent, containing beryl, tourmaline, biotite mica, quartz, and various feldspars. Interesting inclusions and contact phenomena were noted. This material appears of little economic value, but further studies may disclose clues to the still-unsolved problems of the pre-Cambrian of the Front Range, and of Front Range structure.

Introduction

Geologic researches in the Monarch Valley, Grand County, Colorado, led to the discovery of a large exposure of rather typical pegmatite a few hundred feet north of the junction of Arapaho Creek with the Colorado River. Further investigation showed that the major part of Green Ridge (Figs. 2 and 3) was composed of this material, and the name *Green Ridge Pegmatite* was given it[2].

During the summer of 1938, the attention of Dr. E. N. Goddard, of the U. S. Geological Survey, was called to this pegmatite. He confirmed part of the previous findings, cleared up a number of uncertainties, and located inclusions of granite-gneiss and schist at various places.

Further studies, during 1938 and 1939, made possible rough mapping of the exposures, and produced the major part of the data included in the accompanying geologic map (Fig. 3). This paper should be regarded as a preliminary report, based on reconnaissance field work, and subject to revision when and if detailed studies are made.

General topography of this region is shown on the U. S. Geological Survey *Rocky Mountain Park Quadrangle* (1919, 1/125,000) the location of which is shown in Fig. 1. Details of the Colorado River—Arapaho Creek junction area are shown on a recent U. S. Bureau of Reclamation map[3].

The area may be reached from either Granby or Grand Lake via U. S. Highway 34 and the Monarch Lake road. Work within the area of exposure is best done afoot, due to lack of roads and to rugged timbered topography.

Geologic Environment

The Green Ridge Pegmatite is exposed on the western flank of the Front Range, near the contact of the pre-Cambrian Basal Complex with the Tertiary beds of Middle Park. This contact has been eroded by the Colorado River, and the "contact valley" partially filled with morainal material and glacial outwash.

Generalized exposures are shown in Fig. 3.

The Basal Complex, usually classed as pre-Cambrian, consists of schist, gneiss, granite-gneiss, and several granites, as well as numerous minor intrusives. Much of the schist and some of the gneiss is probably correlatable with similar material of the Idaho Springs Formation, of pre-Cambrian age, present on the eastern slope of the Front Range[4].

Other materials comprising this basal complex, of which the Green Ridge Pegmatite is a member, consist of granites and granite-gneisses of pre-Cambrian age, and various intrusives, notably granites and monzonites, of Tertiary age. During Tertiary time occurred much of the commercial mineralization of the Front Range area.

Tertiary materials of Middle Park ("Tertiary Undivided" of Fig. 3) include thick beds of volcanics, locally called the Middle Park Formation, and classed as Paleocene; and an unconform-

(1) Field work in this area was supported in part by grants from the Penrose Fund of the American Philosophical Society.

(2) Ives, R. L. (1938) *Glacial Geology of the Monarch Valley, Grand County Colorado,* Bull. Geol. Soc. Amer., Vol. 49, p. 1049.

(3) Department of the Interior, Bureau of Reclamation, Colorado-Big Thompson Project-Colo. "Granby Reservoir Site, Showing Location of Structures," Drawing No. 63, November 20 1936.

(4) Ball, S. H., Spurr, J. E., and Garrey, G. H. (1908) *Economic Geology of the Georgetown Quadrangle,* Colorado, U. S. Geological Survey Prof. Paper 63, pp. 37-44.

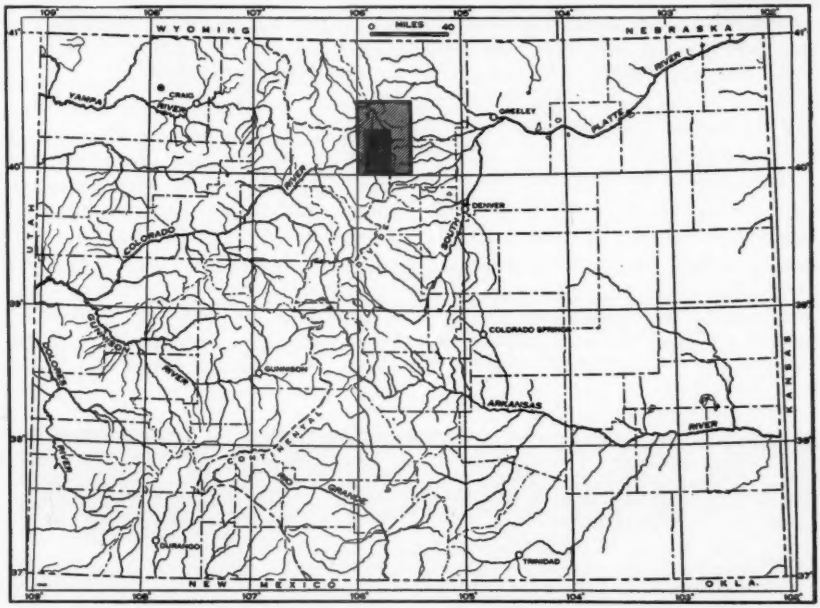


Fig 1 Outline map of Colorado, showing location of the Rocky Mountain National Park Quadrangle (section-lined) and of the geologic map, Fig. 3 of this paper (cross-hatched).

ably overlying series of lavas and lake beds probably representing several later Tertiary ages [5], [6].

Pleistocene materials include several series of moraines, apparently representing part of Illinoisan and all of Wisconsin time; fluviatile and organic postglacial deposits; landslide and avalanche debris; and talus [7].

General relations of these deposits, as shown by local physiography, are demonstrated in Fig. 2.

THE GREEN RIDGE PEGMATITE

General Description

Materials here classed as Green Ridge Pegmatite, and so mapped in Fig. 3, are substantially pegmatite, but with it is much granite-gneiss, some included schist, and many intergrading materials that in the field would be classed as felsites, aplites, and monzonites, but whose exact nature can only be determined after rather extensive laboratory studies.

In very general terms, the average grain size in this pegmatite is small in the northeast, as at East Inlet (Fig. 3), and increases gradually as the Colorado River-Arapaho Creek junction is approached. Southeast of this area, grain size increases rather rapidly toward the Highlonesome, and exposed feldspars have a definitely pinkish tinge.

Exposures of this pegmatite tend to be white on glacially-polished surfaces subject to high-altitude weathering: iron-yellow in distinctly humid areas: very light yellow at exposures subject to semi-arid weathering: and pinkish where rainfall is very slight and drainage excellent. Lack of pink feldspar float down valley from the exposures suggests that this color cannot survive chemical weathering.

Although detailed investigation of local variations within this pegmatite was

(5) Lovering, T. S. (1931) *The Granby Anticline* U. S. Geological Survey, Bull, 822, pp. 71-76.
(6) Ives, R. L. (1938) *Op. Cit.* p. 1049.
(7) Ives, R. L. (1938) *Op. Cit.* pp. 1051-1066.

not possible during the course of this research, such a study entailing weeks or months of detailed field work, one area, in the Colorado Canyon just below the Stillwater Creek-Colorado River junction (Fig. 3), has been mapped to a scale of 1″=140′ by Ross L. Heaton, of the U. S. Bureau of Reclamation. Heaton's map [8] discloses numerous variations from pegmatite to granite, granite-gneiss, or schist, and back to pegmatite, occurring within 100 feet or so. Field studies suggest that these multiple variations and intergradations are present throughout the Green Ridge Pegmatite.

[8] U. S. Department of the Interior, Bureau of Reclamation, Colorado-Big Thompson Project-Colo. "Granby Dam Site, Geologic Map", 211-G-4, Denver, Colorado September 5, 1939. This map is *not* available for general distribution.

MINERALS

A brief, and admittedly incomplete, listing of the minerals found in the Green Ridge Pegmatite, with comments where pertinent, will be given here:

Quartz

Feldspar:—Orthoclase and oligoclase common, microcline reported by prospectors, but not found in the field.

Micas:—Biotite predominates. Some muscovite reported, but several "mus-

Fig. 2 Stillwater Basin and the Front Range, as seen from Table Mountain. The camera was set up at A in Fig. 3, and pointed northeast. In the near foreground is the Granby-Grand Lake road, with the junction of the Monarch Lake road at the extreme right. The flat-floored basin, extending to the thick forest in the middle distance, is eroded in Tertiary materials. Beyond this is Green Ridge, composed mostly of pegmatite, which extends almost to the visible horizon just left of center. The sharp ridge at the extreme left is composed of injected schist, and the wooded flats in the left middle distance are glacial deposits. This is an infra-red photograph. Maximum distance to the visible horizon is about 18 miles.

covite" samples proved to be a typical biotite.

Tourmaline:—Small black tourmaline crystals are present in many locations, but do not seem to be evenly distributed through the pegmatite.

Garnet:—Small garnets of various kinds, usually poorly crystallized, are occasionally found in this pegmatite. Field relations hint that these may be related to included materials, rather than to the pegmatite.

Magnetite:—Very small magnetite granules are present, and are by no means evenly distributed through the pegmatite. Undependability of compass bearings in the pegmatite area suggests that magnetite is more abundant than is indicated by concrete evidence. Black sand concentrates panned in this area contain not only standard magnetite, but various members of the magnetite-ilmenite isomorphous series. There is no conclusive proof that all of this black sand came from the pegmatite area.

Beryl:—Beryl is present in varying quantities throughout the pegmatite, and is found in large crystals, up to 6" across the flats and several feet long, in the Highlonesome. Larger crystals have been reported by prospectors, but were not seen. In very general terms, the beryl crystals are largest near the southeast margin of the pegmatite area.

INCLUSIONS AND CONTACT PHENOMENA

Numerous schist inclusions in this pegmatite have been noted. Their presence, particularly near the margins of the pegmatite area, suggests an intrusive process somewhat analogous to magmatic stoping.

Granites found within the pegmatite may be either local fine-grained phases of the pegmatite or partially digested granite inclusions. As this pegmatite appears to be associated with the earlier granitic intrusions, these granite masses may be logically classified as fine-grained phases of the pegmatite.

Although approximately two thirds of the periphery of this pegmatitic area is obscured by later deposits, contact phenomena are numerous. In Paradise Park (Fig. 3), great masses of schist have been torn loose and carried into a fine-grained contact zone of the pegmatite. These contacts are beautifully exposed as a result of glacial erosion.

In the East Inlet, on the north wall of the valley, the pegmatite plays out, becoming a series of injections into schist. In the vicinity of Pole Creek, the pegmatite grades rather rapidly into granite.

In the Highlonesome, the eastern limit of the pegmatite seems to be a fault, trending roughly north. Attempts to find concrete evidence of this fault, and to "pick up" the pegmatite beyond it, have not been successful, for the suspected location of the fault is an ice-cut valley, which has been filled with several hundred feet of glacial debris.

TENTATIVE DATING

From field relations, it may be stated with great confidence that the Green Ridge Pegmatite is younger than the Idaho Springs Schist, of which it contains inclusions, and older than the mid-Tertiary sediments and volcanics comprising the Table Mountain Formation, for these rest atop eroded pegmatite surfaces.

As the schist inclusions within the pegmatite are identical to bodies of schist unaffected by the intrusion, it may be inferred that the intrusion took place after the ancient sediments were metamorphosed.

The general trend of the pegmatite is parallel to the planes of schistosity of the containing rocks, and these are not as generally crumpled where intruded as elsewhere. This evidence suggests that the intrusion took place prior to the first extensive deformation of the region following the metamorphism, and that the presence of intruded material inhibited local distortion later.

On the basis of this evidence, a mid-pre-Cambrian age is suggested for the Green Ridge Pegmatite. Substantially identical pegmatites at Jamestown, a

comparable location on the opposite side of the range, are about 940,000,000 years old (mid-pre-Cambrian) [9], [10] as determined by Uranium-Lead analyses. The concordance of the various sorts of evidence suggests that the datings are within reason. With materials of this type, under most circumstances, only measurement of uranium-helium or uranium-lead ratios will give conclusive datings.

(9) Lovering, T. S., and Goddard, E. N. (1938) *Geologic Map of the Front Range Mineral Belt, Colorado,* Proc. Colo. Scientific Soc. Vol. 14, No. 1 pp. 16-17.

(10) Goddard, E. N., and Glass, J. J. (1936) *Deposits of Radioactive Cerite near Jamestown, Colo.* (abstract) Am. Mineralogist, Vol. 21 No. 3, p. 199.

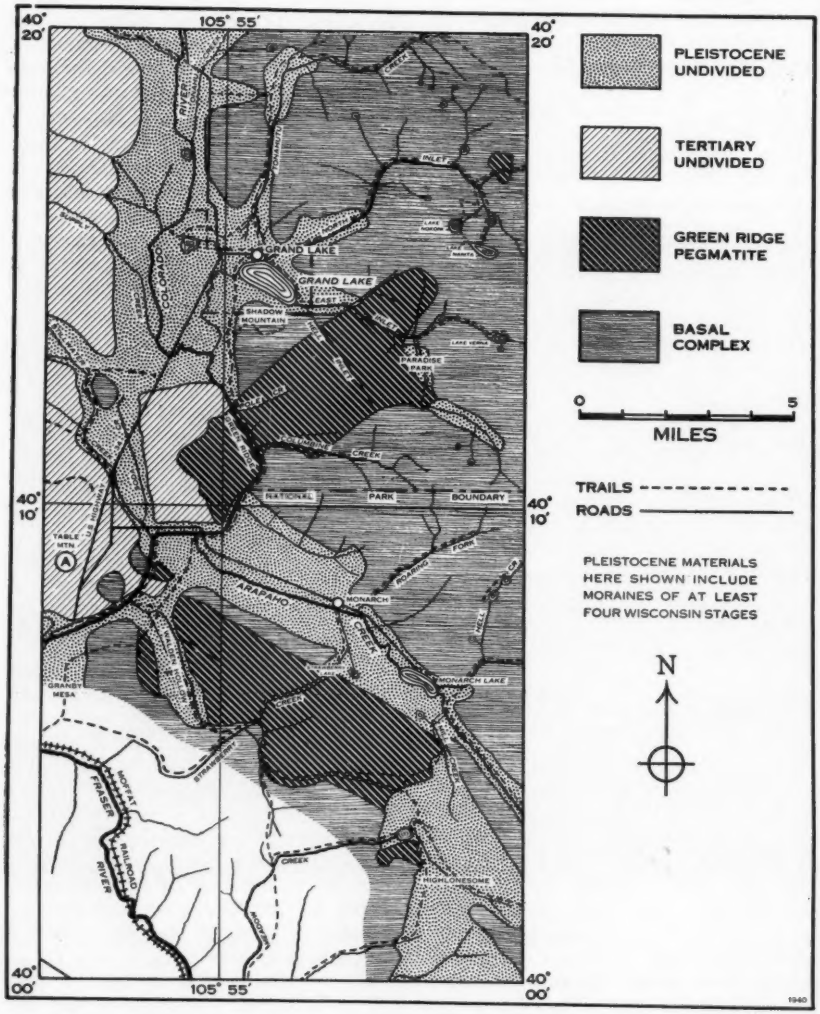


Fig. 3 Areal geology of a part of the upper Colorado Valley, Grand County, Colorado, showing exposures of Green Ridge Pegmatite, and its generalized geologic environment.

ECONOMIC POSSIBILITIES

So far as can be determined from data collected during this study, the Green Ridge Pegmatite has little economic value. Only in the Highlonesome is beryl, the only valuable mineral, plentiful enough to pay the cost of mining, and even here, prospectors' reports indicate that the payoff is small. The northern half of the pegmatite area is within Rocky Mountain National Park, and is closed to entry. Promising locations in the southern part are staked, and most of the claims patented.

From available evidence, it appears that the pegmatite in the Highlonesome, if worked diligently, will pay low day wages to those working them, but, because of lean deposits, long haul problems, high altitude and unfavorable climatic conditions, will never be large, or highly profitable producers.

CONCLUSIONS

From evidence collected during this study, it is found that the Green Ridge Pegmatite is a very large intrusion, of probable mid-pre-Cambrian age.

Extreme variation in mineral composition, low beryl content even in the "richest" parts, high altitude, and other factors all suggest that the commercial value of this pegmatite is very small.

Further studies of the Green Ridge Pegmatite should produce much information concerning the mechanics of intrusion, and may be of value in connection with several problems of Front Range structure and stratigraphy.

EXPEDITION YIELDS MANY SPECIMENS

The physical geology exhibit at Field Museum of Natural History, Chicago, Ill., will be greatly augmented in scope as the result of specimens obtained by Sharat K. Roy, curator of geology, who has just returned from an expedition of more than three months, collecting in both western and eastern states. Various localities in Wyoming, Colorado, South Dakota, Virginia, New Jersey, New York, Massachusetts, and Connecticut were combed by Mr. Roy in his search for rock specimens demonstrating the subject of structural and dynamic geology. During part of the expedition's work Mr. Roy was accompanied by Henry Herpers, assistant curator of geology.

This expedition was in continuance of a project upon which Mr. Roy has been engaged for a number of years. Because there are so many varying phases to be illustrated, the collecting of suitable specimens was a difficult task involving the necessity of traveling to many widely separated areas. When specimens of the type sought were finally found, it was often necessary to spend much time and labor chiseling them free from solid rocks, and sometimes even blasting them out.

Off For the Sunny South!

Dr. L. Prescott Brown and son, Prescott L., together with Dr. A. C. Worth, all of Albany, N. Y., left late Christmas day for the Sunny South with Georgia as their destination and mineral collecting as their occupation. Mines, quarries and mineral localities in general are on their itinerary so a good time is expected by all.

The Editor of *Rocks and Minerals* was invited to go with them but as he leaped forward to accept his left foot became snarled in the January, 1941, issue of the magazine and he was forced to remain behind.

It seems that every mineral collector in the North is going south for the winter—even Ken Pugsley, of Pawling, N. Y.! But Ken got no further south then Bel Air, Md., where he intends to remain for the next few months. We do not know why he should have stopped off when half-way down. Was it the smile of a pretty girl in Bel Air?—the recent issuance of the attractive *Minerals of Maryland* in which a large number of interesting minerals and their localities are listed? —or it is a ruse to entice the Editor of *Rocks and Minerals* to join him? Whatever may be his motive, we are going to sit pretty and watch developments!

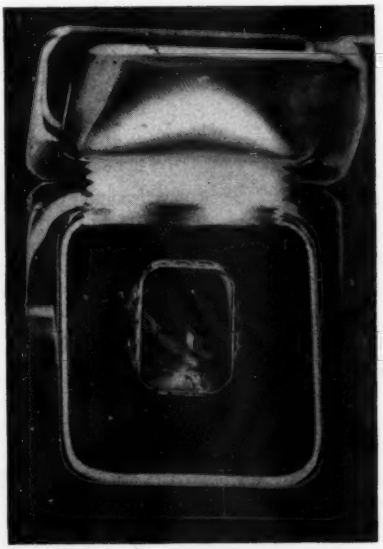
A "BIRD" OF A SPECIMEN

During the summer of 1938, Mr. B. J. Fritz, of Seattle, Wash., made a collecting trip to the Rattlesnake Range in the southern part of his state. This range of hills extends northwest from the Columbia River, which forms the eastern boundary of Benton County, through the adjacent Yakima County and up into Kittitas County where it joins the Cascade Mountains. There are very few rattlesnakes in the area, except along the nearby Yakima River. The hills, however, are full of horned toads but these are harmless—make nice pets for children.

The trip was not for rattlesnakes, nor horned toads, but for minerals and he collected a large number of them of which one turned out to be a "bird" of a specimen. One area yielded many beautiful specimens of petrified redwood. On the top of one hill that was probably 1500 feet above the Yakima River, there was exposed a petrified redwood stump. A part of the root of this stump was dug up and placed in his bag. Incidently the sides of this particular hill were covered with loose blocks of basalt which made walking very difficult. Writes Mr. Fritz: "If you've never tried coming down through this stuff with 150 lbs. of rocks in a sack on your back then you have missed some wonderful exercise."

One day while slicing some of the petrified wood collected on the trip in order to obtain a nice gem for a brooch, he discovered the petrified "bird" which stood out as natural as life. This particular specimen came from the piece of root that had been dug up. The image was so clear and life-like that he was induced to slit the specimens in the hope that another might be inside. It was but headless.

It is difficult to describe this unique and very handsome specimen. It should be seen to be appreciated. The upper two-thirds of the background is a rich red-brown which seemingly depicts trees and autumn foliage. The "rock" that the bird is standing on is tan colored and light brown in the shadow. The bird has a light tan breast, darker on the back. The wing has a color approaching burnt orange and there is a black line on the side of the head extending from the eye to the wing. The colors, of course, are all natural.



A "bird" of a specimen in petrified wood mounted in a ring.

Many collectors and other individuals have seen and admired this beautiful specimen, now set in a ring, and they have tried to identify the bird which has been called everything from a canary to an eagle. Mr. Fritz has many other pictures in petrified wood but nothing that can compare with this unusual specimen for which he has received many offers, one being $500. He does not want to part with his "bird" of a specimen.

Just as we were about to go to press, Mr. Fritz sent in some additional notes on the locality.

"None of the hills in the Rattlesnakes are named but we have always called this one "Redwood Hill". The hill is over the line a few miles in Kittitas County, 16 miles straight north of Yakima (in Yakima County). Redwood Hill is covered with loose basalt rocks about two-thirds of the way down from the top—and the top is about one-third of a mile from its base, measured on the slope. There are several large redwood stumps near the summit but they all are imbedded in nearly solid basalt. The Yakima River flows by at the base of the hill."

Mr. Fritz is a member of the Rocks and Minerals Association and we hope he may send in more interesting notes on some of his other remarkable finds.

Editor's Note: We hope that more collectors throughout the country will send us notes on some of their unusual finds. Many of these finds would not only be of considerable interest to our readers but their recording would be a real contribution to mineralogy. As an example, one such find, made recently by an amateur collector of Camden, Maine, was a rare mineral which heretofore was known from two localities only—one in Sweden and the other in North Carolina. It will be announced in the next issue of ROCKS AND MINERALS.

COLLECTOR'S KINKS

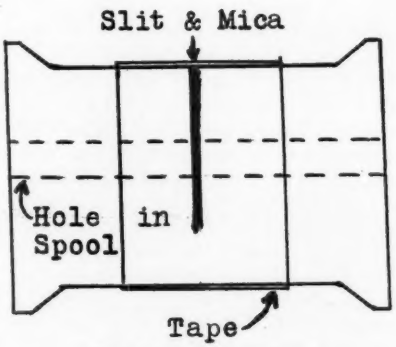
Collectors are cordially invited to submit notes from their experiences and so make this department of interest to all.

An "Asteriated" Telescope

A number of months ago, Jack Boyle, Curator of Minerals at the Children's Museum in Brooklyn, N. Y., was given a large number of small wooden spools with the hope he might be able to put them to some use. He did. Instead of a hundred or more useless spools he soon had an equal number of "asteriated" telescopes for the use of his many students. These instruments proved very popular with the youngsters.

This "asteriated" telescope is so simple in construction that any collector can make one. The most essential item needed is an asteriated mica which shows star-like rays when held before a bright light (candle-light is best).

In making his telescope, Mr. Boyle cut a narrow slit in about the center of the spool and to a depth of about three-quarter's of the diameter. A thin sheet of asteriated phlogopite was inserted in the slit and to keep it snug in place a paper tape was pasted over the slit, oftentimes



The "Asteriated" Telescope

completely encircling the spool. The tape also served as the label for the mica which came from the C. C. Brown Mine, Cantley, Quebec, Canada.

The asterism can be seen through either end of the spool. In two specimens examined, one showed 12 equal rays, the other six major and six minor ones.

NEW ENGLAND NOTES

Conducted by Rudolf C. B. Bartsch

36 Harrison St., Brookline, Mass.

The end of the 1940 collecting season arrived in New England before Thanksgiving Day this year. A heavy blanket of snow with a severe cold spell put on the finishing touch. Of course a thaw in southern New England will open up some localities to those that can stand the cold. Some of the best collecting I have done at the Portland, Conn., localities has been during the mid-winter months when there has been little or no competition.

Mr. Philip Morrill, of East Greenwich, R. I., has called my attention to some localities which I as yet have not visited. I am, therefore, quoting from his notes.

Berry Quarry, Poland, Maine. Some nice quartz groups are to be found here as well as colored tourmaline, lepidolite, beryl, talc and fine apatite ccrystals. Admission of 50c is charged. Drive into the farm house which sets back from the road on south side of the Little Androscoggin River—opposite Mt. Apatite.

Bennett Quarry, Buckfield, Maine. This famous quarry is again under operation after several years of idleness. Lepidolite, manganapatite, tourmaline, blue beryl, and occasionally nice pink caesium beryl may be found. A very fine etched, golden beryl, gem quality and terminated was recently found here, in a cavity. I understand that admission is charged at this quarry and your finds inspected and if too good you must pay for them.

Dudley Quarry: One mile west of Buckfield, Maine, on road to South Paris. Not much here and hardly worth the time to visit.

Hebron, Maine: Still good picking ground for the usual pegmatite minerals. Many phosphates are present including lithiophilite and eosphorite.

Paris, Maine: Rose quartz quarry. When returning from Mt. Mica and going down hill from the village of Paris Hill, bear left on dirt road and park car at farm house on highest point of road. Go straight up the hill and a series of pits will be found running around the hill. Some of the best gemmy rose quartz is to be found as well as nice garnets, the last in the largest working to the extreme west.

Kings Mt., Maine. A large quarry may be seen from Mt. Mica, looking south. It is reached by going south up hill from the South Paris-Hebron road. Rather poor collecting. Some beryls are available.

Litchfield, Maine. The famous Dennis Hill locality for cancrinite still has possibilities if one follows the glacial drift across the country.

New England collectors how about it? There must be some of you that have visited localities which we haven't as yet mentioned and which you should be willing to let your fellow collectors know about. O course we know there are special secret spots but let us hear about those that you are not so keen about. Some one else may find something that does not interest you but may be extremely valuable to them. Vermont collectors, how about your state? According to Dana's *System of Mineralogy* there are almost as many localities listed in your state as in the rest of New England put together, but we rarely hear of any of them now except Chester and Gassett. Why? Surely there must be much interesting material there!

Dont' take yourself too seriously, you might stumble over your own feet.

A DAY IN NEVADA

By CLARK HARRISON

(West Coast Correspondent for ROCKS AND MINERALS)

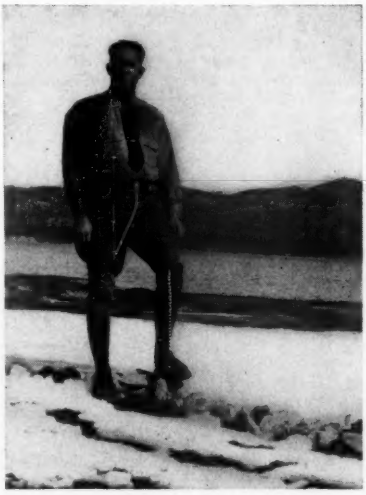
Back in September, 1940, forty members of the Pacific Mineral Society, Inc. of Los Angeles, California, headed by their president, L. H. Milligan, decided to take advantage of the three day holiday ocassioned by Labor Day, and invade Nevada. This was the longest trip they have yet made, the round trip covering 1000 miles. The weather was ideally cool and no mishaps marred the journey.

Tonopah, Nevada, was chosen as headquarters, and Mr. C. C. Boak, Secretary of the Nye County Improvement Society at Tonopah, took the visiting mineralogists in hand as host, and welcomed them with the characteristic courtesy and kindness of Nevada. Tonopah is a typical western mining town, having produced more silver than any other district in the state. If all the silver produced in this area were coined into silver dollars and laid edge to edge they would reach from the northernmost tip of Alaska to Cape Horn, South America — or farther than the distance that Howard Hughes, world girdling aviator, flew in July, 1938, when he flew around the world in three days and 19 hours. And that distance was 14,690 miles! New York's 95 skyscrapers are valued at $760,340,000, or about one-third more than the production of the Tonopah area alone, of silver, gold, lead and zinc. As yet, the surface has just been scratched. There are "makings" of dozens of more skyscrapers in "them thar hills" 'round Tonopah!

Interesting Localities Visited

Mr. Boak first took the group out to the Mispah mine. This is a typical silver mine, the ore coming mostly as enargite. The first morning was spent here, and through the kindness of the mine superintendent, Ed Klavin, the mine's operation was explained, and fine specimens of silver ore given to the visitors: horn silver specimens to the ladies and argentite samples to the men. In the afternoon the visitors were guided by Mr. Boak to localities where they found excellant specimens of petrified wood and red chalcedony.

The next day Mr. Boak took the visitors over to Manhattan Gulch, 42 miles away, to see one of the largest gold dredges in the world in operation. It cost $800,000, and has a daily capacity of 14,000 yards. It has two huge stackers, and 104 one and a half ton buckets made of manganese. The digging lips are made of manganese, also, for tough metal is required in digging deep gravel. These lips are changed every two months. They are cutting in a valley between mountains, 75 feet deep, and 20,000 gallons of water are piped into the dredge pool from wells 10 miles away. The valley is of sedimentary origin, and several thousands of dollars per day are recovered. Recovery of the gold is by jigs, ripples and



Clark Harrison, Columnist and Writer and West Coast Correspondent for ROCKS AND MINERALS

amalgmation. The gold amalgam is then taken to the laboratory where it is retorted to sponge, melted, and poured into bricks worth $7,000 each. Superintendent James was extremely kind to the visitors, permitting them to examine the dredge, and take samples.

From here the group visited the home of Dr. H. G. Clinton, a graduate of Harvard University, where they had a chance to inspect and study one of the finest mineral collections in the country. Dr. Clinton gave the visitors many fine specimens such as variscite, metacalciowardite, manganeous-calcite and stibnite. It was learned that the great financier, Charles M. Schwab, got his start in the mines around this region. They next visited the White Caps mine where they secured some fine crystal specimens of realgar and orpiment.

Nevada Rich in Minerals

Nevada averages about 315 by 350 miles in size, has an area of 109,821 square miles and averages about 5,500 feet above sea level. Surface mostly desert land, traversed by nearly parallel mountain ranges, between which are valleys from 5 to 20 miles. It is in such valley that the big Manhattan Gulch dredge is operating. And there are plenty more of them. The highest point in the state is 13,145 feet on Boundary Peak (Esmeralda county) while the lowest is in Clark county along the Colorado river and is 470 feet above the sea. Its mountains have produced over a billion dollars in mineral wealth, total value of the state's minerals in 1937 being $38,871,816. It ranks as 25th in mineral production, its principal mineral products being gold, silver, copper, and tungsten.

Nevada is America's largest producer and exporter of turquoise. The world's largest deposit of brucite is located there; important deposits of bariums, fluorites, sillimanite, cyanite, manganese, coal, micas, diatomaceous earth, arsenic, bismuth, magnesites, antimony, sodas, borates, manganiferous hematite, sulphur, aluminum clays and minerals, bentonites, tungstates, molybdates, potash alums, lead, zinc, filtering clays are known; while they boast incomparable jaspers, marbles, aragonites, petrified woods, etc. Precious metals are waiting for the scien-

Tonopah, Nevada

tific prospector. A veritable storehouse of non-metallic and industrial minerals are waiting for development and utilization.

Nevada a Scenic State

Nevada is a beautiful scenic state, also. It is all that the Easterner expects of Western mountains and deserts. It has its Western towns like Las Vegas, and Virginia City, both steeped in tradition and lore of the Old West, of mines and ranches. At Searchlight we find the ranch of Rex Bell, Hollywood cowboy star, and his wife, the former Clara Bow, "it" girl of a few years ago. There are lovely resorts, like the one a mile high on Charleston Peak near Las Vegas. In the Black Canyon of the Colorado river, is the highest dam in the world—Boulder Dam, completed March 1, 1936. The average mean temperature is 49.8; highest on record 102, lowest on record 19 below zero. It is a dry, healthy state, having an annual rainfall of 7.63. When its mineral resources are developed more fully in the future we shall probably be amazed at the abundance and variety of gems and rare minerals that will probably be uncovered. Only a short time ago emeralds were discovered at Ryepatch. What else, is held by the future!

In returning to Los Angeles, the mineralogists decided to split and return different ways, so as to cover more territory. One group returned by way of Montgomery Pass. They found some nice specimens of brown obsidian. The group that came by way of Beatty found myrickite and Wonderstone. The hearty welcome accorded by these Nevada people together with the variety of gems and minerals this state has to offer has encouraged this society to contemplate another visit into the state in the near future.

. . . Club and Society Notes . . .

Southwest Mineralogists

The Southwest Mineralogists of Los Angeles, Calif., are proud of their newly adopted emblem, "The Carlsbaad Twins", which now appears on their stationary and on their badges. The Twins represent their twin interests in the Lapidary Arts and the Earth Sciences.

The October Field Trip included the Mineral Exhibit held at Barstow, as well as an opportunity to search for petrified palm wood near Yermo. John Akers, Past President of the club, has recently returned from a trip to Zion National Park, and Harold Eales, President, visited Death Valley. Both gave interesting accounts of their trips. Mr. J. H. McCornack, of the Los Angeles Lapidary Society, was a guest speaker at the November 15th meeting. He gave an excellent discourse on the "Methods Used in Locating the Optical Axis in Asteriated Quartz in the Rough Material."

Mr. Shannon, from the Keese Engineering Company, will give the members a talk and demonstration of Black Light at the November 29th meeting at the Los Angeles Playground, in Los Angeles. Mr. Frank H. Crawford will present a Lapidary Demonstration at the following meeting of December 6, 1940.

Pearle Arnold,
Corres. Secretary.

Plainfield Mineralogical Society

A regular meeting of the Society will be held on Tues., Jan. 7th, at 8:00 p.m., in the Plainfield Public Library, Plainfield, N. J. The guest speaker will be Mr. H. M. Paskow, the "Aquamarine King", who recently returned from a 30,000 mile gem-purchasing trip to Asia. This will also be ladies' night.

On Sat., Jan. 18th, a trip will be made to Columbia University, in New York City, to view the many fine minerals on display there. Dr. Paul Kerr, of the Department of Mineralogy, will be host and leader.

Splatter, splatter, diamond saw,
You cause my wife to fume and jaw,
For you have sprinkled every shirt
With polka dots of oil and dirt.

BIBLIOGRAPHICAL NOTES

Risborough-Marlow Area
Frontenac County
By Carl Faessler

A geological report on a region once worked for gold, silver and tungsten. Issued as Geological Report No. 3 (1939), 18 pp., 1 fig., and 1 geological map (in color).

Lepine Lake Area
Destor Township, Abitibi County
By H. M. Bannerman

A geological report on an area in which are located a number of gold mines. Issued as Geological Report No. 4 (1940), 28 pp., 8 pls., and 1 geological map (in color).

Fortune Lake and Wasa Lake Map Areas
Dasserat and Beauchastel Townships
By G. S. MacKenzie

The geology of these two areas has been examined and mapped because of the interest occasioned by new discoveries of gold-bearing mineralized zones. Issued as Geological Report No. 5 (1940), 27 pp., 6 pls., 3 geological maps (2 in color).

The above three reports are issued by the Bureau of Mines, Quebec, Que., Canada.

Fifteenth List of New Mineral Names
With an Index of Authors
By L. J. Spencer, C.B.E., M.A., Sc.D., F.R.S.

In this new list, 223 minerals are listed alphabetically and briefly described; also a long list of authors of mineral names. This list appeared in the MINERALOGICAL MAGAZINE, Sept. 1940, Vol. XXV, No. 170, pp. 621-660, (Amen House, Warwick Square, London, E. C. 4, England).

Previous lists of this series have been given every three years at the ends of Vols. 11-24, (1897-1937) of the MINERALOGICAL MAGAZINE. The 1506 names in the first ten lists are included in one alphabetical arrangement in the General Index (1926) to Vols. 11-20 (1895-1925).

California Journal of Mines and Geology:

In the April, 1940, issue (Vol. 36, No. 2), the mineral resources of Mono County, Calif., are featured. Many mines are described, some only briefly, which includes a large number of minerals occurring at them. A large number of photos also appear in this interesting journal of 137 pages which is a quarterly chapter of the State Mineralogist's Report XXXVI.

Issued by the Division of Mines, Ferry Building, San Francisco, Calif.

Report of the Committee on the Measurement of Geologic Time, 1939-1940.

Alfred C. Lane, Chairman, John Putman Marble, Vice-Chairman.

Presented at the Annual Meeting of the Division of Geology and Geography, National Research Council, April 27, 1940.

The report contains an annotated bibliography of selected articles dealing with the measurement of geologic time, and supplementary reports on the works of various authors.

Issued by the National Research Council, 2101 Constitution Ave., Washington, D. C., September, 1940, 141 pages.

Vital Gaps in New York Metropolitan Arteries:

Although this report has nothing in it of geological or mineralogical interest, it does contain many fine photos—some being airplane views—and maps in color, of and around New York City. The report has been issued to aid National Defense by filling vital gaps in the present system of New York Metropolitan vehicular arteries.

Issued by the Triborough Bridge Authority, Randall's Island, New York City, Nov. 11, 1940.

ATLIN NUGGET VALUED AT $1,000

The Alaska Weekly, Dec. 13, 1940

ATLIN, B. C.—One of the largest gold nuggets ever located in British Columbia since the early boom days was found late in September at Boulder Creek.

The lump of solid gold weighed 31 ounces and is valued at more than $1,000.

The two and a half pound mass of precious metal was recovered at the hydraulic operations of the Consolidated Mining & Smelting Co. on Boulder Creek.

S. G. Blaylock, president of the company, said it was one of the most spectacular nuggets found in years.

. . Collectors' Tales . .

By PETER ZODAC

Everything comes to him who waits!

There is in the private collection of John A. Grenzig, the well-known and popular mineral dealer of Brooklyn, N. Y., a very fine specimen of white, radiating natrolite from an old trap rock quarry in Guttenburg, N. J. The specimen was personally collected by Mr. Grenzig in 1900. The quarry, which was right on the edge of the Hudson River, across from New York City, has long since been abandoned and in fact it has been built over so that one might not recognize it as a quarry were he to view it now for the first time.

In those old days Mr. Grenzig made frequent trips to the locality and collected many nice specimens. The superintendent and he became quite friendly, due to these visits. One day he chanced to find in the corner of the quarry a not-too-large pocket at the end of which was the above mentioned natrolite. The pocket was a deep one, however, and he could by stretching get his entire arm in it which allowed him to just touch the natrolite—there was no room for work. As the rock was very solid, it was impossible to break it up with a sledge hammer. There was only one thing left to do—wait until blasting operations reached that end of the quarry.

He appoached his friend, the superintendent, to inquire when blasting would be done in that end of the working where the pocket was located and was told it would be "tomorrow." The next day Mr. Grenzig was on the scene but no blast was set off. The following day he was there again and again was he disappointed. He showed up the third day and with similar results. Not a bit discouraged he made his appearance on the fourth day and his faith was rewarded—preparations were in progress for blasting around the pocket.

As the blasting hour drew nigh, Mr. Grenzig became a little excited. When the actual moment arrived, he layed down behind a protecting rock from which point he could observe the operation without danger of being hit by flying rocks. Suddenly there was a dull sound—more in the nature of a smothered roar—and then all was quiet. The blast was a failure. The superintendent and his blasterer went forward to investigate the poor shot and Mr. Grenzig went with them. On reaching the quarry face they found that the shot had formed but a crack in the wall. To the great joy of Mr. Grenzig, however, the crack went right through the pocket which was opened in such a way that its end was in open sight. All Mr. Grenzig had to do was to pick up the natrolite which miraculously had been loosened and unharmed. Though it took four days to collect the specimen the quality and beauty of the natrolite was well worth the effort.

Dont' crack a whip, crack a joke—you will get better results.

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BOOKS

Handbook For the Amateur Lapidary by J. H. Howard, 16 chapters covering all phases of gem cutting and polishing, 141 pp., 44 illus., price $2.00. J. H. Howard, 504 Crescent Ave., Dept. R., Greenville, S. C.

How to Collect Minerals. By Peter Zodac. A guide book for the collector, 80 pp., 15 ills., $1.00. Rocks and Minerals, Peekskill, N. Y.

Fifty Back Numbers of Rocks and Minerals Magazine, all in good condition and all different, $10.00. If you have back numbers send a list of them with your order and we will try not to duplicate any of them. Rocks and Minerals, Peekskill, N. Y.

FOSSILS

Fossils, Minerals, Old Arms, Indian Beaded Trappings, prehistoric specimens, general line of curios. Lists 10 cents. N. E. Carter, Elkhorn, Wisc.

EXCHANGES

I WANT TO EXCHANGE MINERALS. CAN OFfer fayalite, forsterite, thorite, triphyllite, heterosite, manganapatite for good specimens from other localities. Gunnar Bjareby, 147 Worthington St., Boston, Mass.

Collectors! Do you want to exchange minerals with other collectors? Your exchange ad inserted here will contact them. Send it in today!

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Scott Rose Quartz Co.—Rose Quartz, Black Hills specimens, all kinds and colors; for rock gardens, cabinets, etc. Boxes: 24 specimens, $1.00; 18 specimens, 50c; 15 specimens, 35c. Postage paid. Box 516, Custer, S. Dak. Send stamp for price list.

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Labradorite—Gem Quality, $2.00 per pound. Special price on fifty pound lots and over. John Vlismas, 244 East 77th St., New York City.

Millerite from Milwaukee, Wisconsin. Benedict P. Bagrowski, 1014 Vt., Lawrence, Kansas.

Minerals, Fossils, Indian Relics, Books, Coins, Curios, Stamps. Old Glass. Catalogue 5c. Indian Museum, Osborne, Kansas.

Uvarovite—Choice specimens. Minute brilliant emerald-green crystals coating ore. For details write: H. Goudey, Jamestown, Calif.

"The Finest in Tri-State Specimens: Octahedral Galenas, Ruby Sphalerite, Spearpoint Marcasites, Twin Sphalerite xls, Calcite groups, bulk ores, Cerussite xls. Write for prices, Boodle Lane, Box 45, Riverton, Kansas.

New England minerals for sale or exchange. Correspondence solicited. Rudolf C. B. Bartsch, 36 Harrison St., Brookline, Mass.

Mineral Specimen Cabinets—15 to 100 specimens. Prices 35c to $10.00. Cabinet specimens—free price list. Charles O. Scott, 739 Colorado Ave., Trinidad, Colorado.

Ten Year Accumulation Various Stones removed from jewelry, 200 assorted $2.00. B. Lowe, Box 525, Chicago, Ill.

Opals for cacti rock gardens. Send dollar note for good assorted selection. N. H. Seward, "Opal House," Melbourne, Australia.

Arizona Minerals for sale and exchange. Luther Steward, Phoeniz, Arizona.

Genuine cut zircons, blue, brown, white—$1.50 per carat. B. Lowe, Box 525, Chicago, Ill.

SPECTROSCOPES

Spectroscope For Quick Ore Analysis $2.50. Cuffing Sons, Campbell, Calif.

MISCELLANEOUS

Wanted—Used petrographic microscope. Write full particulars. Paul Thomas, 305 East Jefferson, Yazoo City, Mississippi.

Valuable Quicksilver Property in southwest United States for sale or lease. T. T. D., c/o Rocks and Minerals, Peekskill, N. Y.

Gem Cutter and Polisher experienced, with good references, is wanted for steady job in Western New York. Please write to Chiffre, care of Rocks and Minerals, Peekskill, N. Y., and give details of your ability.

Amateur Collectors—Send for list. W. I. Beecroft, Rt. 2 Box 871, Escondido, Calif.

New Mounting Method—3c stamp brings specimen green lepidolite and list. General Science Service, 1815 Lyndale, Minneapolis, Minn.